REMARKS/ARGUMENTS

1.) Claim Amendments

Applicants have amended claims 1 and 21. Accordingly, claims 1-40 are pending in the application. Favorable reconsideration of the application and allowance of the pending claims is respectfully requested in view of the foregoing amendments and the following remarks.

2.) Claim Rejections – 35 U.S.C. § 103(a)

In paragraph 11 of the Office Action, the Examiner rejected claims 1-9, 10-11, 14-17, 21-29, 30-31 and 34-37 under 35 U.S.C. § 103(a) as being anticipated by the article "Improving Wireless LAN Performance via Adaptive Local Error Control" by Eckhardt, et al. ("Eckhardt") in view of Khayrallah, et al., US 5,920,597 ("Khayrallah"). Applicants respectfully traverse Examiner's reasoning and conclusion in rejecting claims 1-9, 10-11, 14-17, 21-29, 30-31 and 34-37 based on Eckhardt, in view of Khayrallah.

The present invention continuously estimates and determines the channel condition and then adapts accordingly. More specifically, the present invention is directed toward determining whether the channel degradation is based on noise or interference, and then adapting the coding and packet length based on such determination. It is not disputed that the general concept of "changing to something more robust if the channel becomes worse" is well known in the art, as indicated by the examiner. However, the present invention comprises a novel method of combining different metrics to determine in what way (noise or interference) the channel becomes worse, such that intelligent, dynamic action can be taken to improve the effectiveness of the communication link.

In light of the foregoing, Eckhardt discusses the advanced adaptive algorithm FLEX, which can be viewed as a generalization of other algorithms. FLEX adapts packet size and forward error correction ("FEC") independently (See Section 6.3 of Eckhardt). Specifically, FLEX is not directed toward determining the extent to which noise and/or interference is the problem. Instead the best packet choice is determined by trial and error. Thus, FLEX cannot consistently provide the same result as the

present invention. Consider, for example, how the error correcting capability is changed. In FLEX, if no decoding failures are experienced, the decoding capability is decreased. If FLEX were an intelligent method as disclosed in the present invention, it would determine, without trial and error, how many errors were corrected by the code and if the code rate should be changed. The FLEX algorithm is completely different from the present invention which adapts the packet size and coding as disclosed in Figure 3 of the present invention.

Referring now to Khayrallah, Khayrallah does not address how to determine whether a channel is being noise or interference limited, much less how a device or system should respond once the distinction between noise and interference has been made. For example, Khayrallah does not discuss changing packet lengths. Recall that a channel might be noise limited for short coded packages but interference limited for long packages coded at the same rate. In contrast to the present invention, Khayrallah assumes a fixed (or at least similar) packet length. In the example disclosed by Khayrallah, it is assumed that the channel is noise limited in satellite communication and co-channel interference limited in telecommunication cellular communication. Thus, in Khayrallah, one must know what system is used in order to determine if noise or interference is the problem. Clearly this has nothing to do with using a channel quality measure to determine the source of degradation as provided in the present invention.

There is no suggestion or motivation in either Eckhardt or Khayrallah to combine these two references to obtain the present invention. Neither Eckhardt nor Khayrallah discuss nor suggest the need to determine if noise or interference is the major cause of degradation. In contrast, the present invention is specifically directed to dynamically adapt based on a determination of whether noise or interference is the cause of the degradation. In the present invention, if noise is degrading packets, a change is made to subsequent packets. If, thereafter, interference is a problem for the new packet type, then another change is made. Eckhardt does not disclose nor suggest this method of improving the communication link. In Eckhardt, packet length and coding are chosen independently of one another.

MPEP 2143 states that obviousness cannot be established by combining prior art to produce the claimed invention absent some teaching or suggestion supporting the

combination. The mere fact that the prior art may be modified in the manner suggested by an examiner does not make the modification obvious unless the prior art suggests the desirability of the modification. With respect to claims 1 and 21, the cited references do not suggest that a person of ordinary skill in the art would have found it obvious to combine the references in the manner proposed. In particular, none of the references cited have recognized the advantages discussed in the present application. Nonetheless, additional limitations have been added to claims 1 and 21 to further distinguish the claimed invention from the combination of Eckhardt and Khayrallah. Support for these further limitations can be found in the originally filed specification at page 16, lines 3-19 and pages 17-25 and Figure 3. The examiner's consideration and allowance of the amended claims is respectfully requested.

Claims 2-9, 10-11 and 14-17 depend from amended claim 1 and claims 22-29, 30-31 and 34-37 depend from amended claim 21. Thus, each such set of claims incorporate the further limitations of claims 1 and 21, respectively. Therefore, examiner's consideration and allowance of these claims is respectfully requested.

In paragraph 12 of the Office Action, the Examiner rejected claims 1-2, 11-13, 21-22 and 31-33 under 35 U.S.C. § 103(a) as being unpatentable over the Bluetooth Core Specification Version 1.0 B ("Bluetooth 1.0B") in view of Balachandran, et al., US 6,567,375 ("Balachandran") and in further view of Khayrallah. Applicants respectfully traverse Examiner's reasoning and conclusion in rejecting claims 1-2, 11-13, 21-22 and 31-33 based on Bluetooth 1.0B in view of Balachandran, and further in view of Khayrallah.

Bluetooth 1.0B discloses changing between coded and uncoded packages based on channel quality. However, the disclosed algorithm is not based on estimating and determining if noise or interference is the primary cause for degradation. While changing packets based on some channel quality, such as packet error rate alone, may be known in the art, Bluetooth 1.0B does not disclose or otherwise suggest estimating and determining if noise or interference is the primary cause for degradation.

Further, Balachandran does not disclose or suggest the present invention as it is directed toward an entirely different aspect of data transmission, that is providing a method for reducing time delay of data delivery by storing a data packet to be

transmitted, transmitting the first segment at a first modulation and coding scheme level and transmitting a second segment of the data packet at a second modulation and coding scheme level that is more robust. The teachings of Balachandran in combination with Bluetooth 1.0B, do not correlate in any way to the teachings of the present invention. Applicants respectfully traverse Examiner's conclusion in paragraph 12, pages 13 and 14 that one must determine if the system is noise or interference limited in order to appropriately change packet type. None of the cited references disclose or suggest the foregoing, and, until the present invention disclosed such method, it was not obvious to do so. Prior art, such as Eckhardt, focus on changing packet types on a trial and error basis, and thereafter taking the packet type giving the best result.

More specifically, Balachandran discloses how a Protocol Data Unit ("PDU") can be communicated with a minimum of delay by using proper coding and modulation for the one or several segments that are used to transmit a certain PDU/packet. In Balachandran, it is important that the size of the PDU is taken into account when choosing parameters for the physical layer. That is, the system should take into account how many segments are needed in order to deliver the entire PDU. Balachandran has found it advantageous to use different coding/modulation for the different segments even if the channel quality is the same.

The Examiner refers to column 6, lines 18-22 of Balachandran, which states "using more robust coding when the packet is small". However, the foregoing phrase must be read in context of the Balachandran invention. What is meant by this phrase is that if the PDU/packet is so small that it can be transmitted by only one segment (or possibly a few, Balachandran refers to "the size of BT"), then one should encode this heavily to minimize the chance that a retransmission is required. As packet size increases (implying that several segments are needed), then less coding is preferable according to Balachandran. The rational for the Balachandran scheme has nothing to do with the channel conditions as they are assumed to be the same for each packet. Instead the reason for this scheme is that if less coding is employed, fewer segments are needed to transmit a packet of a certain length (See column 6, lines 18-25 of Balachandran). Since the Invention of Balachandran, as reflected in the title of the

Balachandran patent (as noted by the examiner), has to do with adaptation of the physical layer parameters based on what is to be delivered from higher layers, and the rational for using more or less coding are based on that, the sentence above is out of context when applied to the present invention. It is noted, that in Balachandran, the segment length is the same in all cases (20 ms), and that the dependence of the packet size refers to the size of the PDU not the size of the segment transmitted over the channel. Balachandran, in combination with Bluetooth 1.0B and Khayrallah, does not discuss, suggest or contemplate how to adapt coding and packet length based on changing channel conditions.

Khayrallah is discussed above and the discussion is incorporated herein by this reference.

Although none of Bluetooth 1.0B, Balachandran and Khayrallah, disclose or suggest the present invention, alone or in combination, Applicants have nevertheless amended independent claims 1 and 21 to further distinguish the claimed invention from the cited references. Claims 2 and 11-13 depend from amended claim 1 and claims 22 and 31-33 depend from amended Claim 21. Thus, each such set of dependent claims incorporate the further limitations of claims 1 and 21, respectively. Therefore, examiner's consideration and allowance of these claims is respectfully requested.

In paragraph 13 of the Office Action, the Examiner rejected claims 18-20 and 38-40 under 35 U.S.C. §103(a) as being unpatentable over Eckhardt in view of Khayrallah and further in view of Ward, et al., US 5,701,294 ("Ward"). Applicants respectfully traverse Examiner's reasoning and conclusion in rejecting claims 18-20 and 38-40 based on Eckhardt in view of Khayrallah and further in view of Ward.

Khayrallah and Eckhardt are discussed above and such discussion is incorporated herein by this reference.

Ward addresses the problem of making the optimum trade-off between channel coding and speech coding. As seen in Figure 5 of Ward, the optimum choice depends on the channel conditions which are being experienced. Notably, as disclosed in column 2, lines 9-13, the interference referred to in the carrier to interference ratio ("C/I") comprises both noise and interference. Thus, Ward makes no attempt distinguish if noise or interference actually is the source of degradation. Column 8, lines 49-54 of

Ward, which are cited by the examiner in relation to Claim 18, provides that both bit error rate ("BER") and signal strength ("SS") *can be used to estimate C/I.*

In contrast, dependent claim 18 of the present invention provides that the SS together with the error detection can be used to determine *if the channel is noise or interference limited* (as claimed in claim 1). Thus, the objective of Ward is entirely different from that of the present invention.

Likewise Ward is improperly applied to claims 19 and 20. Ward is concerned with whether the C/I ratio is sufficient. In contrast, the present invention is concerned with determining if the source of degradation is due to noise or interference. The foregoing distinction is supported by Figure 1 of Ward. This figure is labeled "Distance from base station" on the x-axis and "signal strength" on the y-axis. Clearly, then, the overriding reason for a poor C/I is that C decreases as the distance to the base station is increased. In a cellular system, which is what Ward is concerned with, the quality is very much dependent on the distance from the base station, since the system is planned to some extent have control over the interference level. In the present invention, more properly applied to a Bluetooth like system, the interference is not under control. Therefore, even if the desired signal C is large, this does not guarantee that the ratio C/I is large since an interfering device might be closer to the receiver than the transmitter of the desired signal is.

Finally, the strongest argument that Ward is not applicable to, and hence does not suggest, the present invention is that as the interference level increases in Ward, more robust modulation and channel coding is suggested as disclosed in Table II. This is because in Ward, interference means both noise and interference. In the present invention, the approach is that if the interference level is increased (as distinguished from noise) then less coding should be used, since coding is not effective against interference. Ward discloses that signal strength and transmitted power can be used to determine link quality in terms of C/I, but notably it does not teach anything about how these factors can be combined with other quality measures in order to distinguish between noise and interference.

Although Khayrallah, Eckhardt and Ward, in combination, do not suggest the present invention, Applicants have nevertheless amended independent claims 1 and 21

to further distinguish the claimed invention from the cited references. Claims 18-20 depend directly, or indirectly, from amended claim 1 and claims 38-40 depend directly, or indirectly, from amended Claim 21. Thus, each such set of dependent claims incorporate the further limitations of claims 1 and 21. Therefore, examiner's consideration and allowance of these claims is respectfully requested.

3.) Prior Art Not Relied Upon

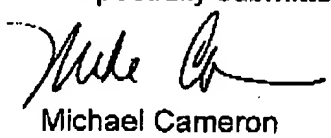
In paragraph 14 of the Office Action, the Examiner stated that the prior art made of record and not relied upon is considered pertinent to the Applicants' disclosure. A review of each of such references, alone and in combination do not disclose or suggest the present invention.

CONCLUSION

In view of the foregoing remarks, Applicants believe all of the claims currently pending in the Application to be in a condition for allowance. Applicants, therefore, respectfully request that the Examiner withdraw all rejections and issue a Notice of Allowance for claims 1-40.

Applicants request a telephonic interview if the Examiner has any questions or requires any additional information that would further or expedite the prosecution of the Application.

Respectfully submitted,



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